CHAPTER 13: ADF IMAGE SCANNING SECTION

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ADF PCB Original IN sensor
– Light up when light path is blocked

THEORY OF OPERATION

1. ADF Original Loading System

- Basic

An original is loaded into the ADF unit via the Original pickup motor and waits until the "START" button is pressed to start the image scanning operation.

- Start of Original Loading

When originals are set in the ADF unit, they push the actuator out of the ADF original detection sensor.

2 seconds later, the Original pickup solenoid is energized and lowers the ADF pickup roller (upper).

200ms later, the Original pickup motor is energized to turn the ADF pickup roller (upper) and ADFstripper roller (via ADF gear and belt).

- Pickup of One Original

As the ADF stripper is pressed against the ADF stripper roller, one original is separated and fed into the ADF unit by rotation of the ADF stripper roller.

The original pushes the actuator out of the Original registration sensor, and **200ms** later, the Original pickup solenoid and Original pickup motor are turned OFF.

10ms later, the ADF read pulse motor is activated to turn the ADF transfer roller, White roller (Read roller) and ADF exit roller (upper) via pulleys and belts.

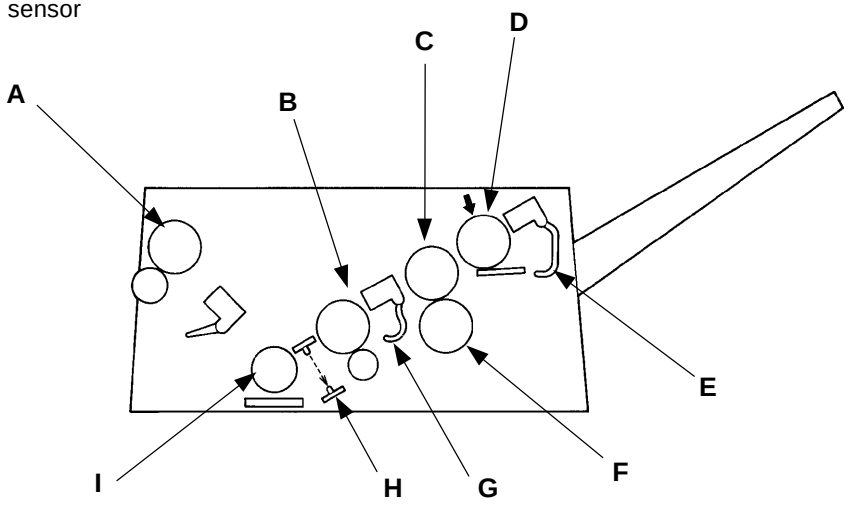
- Finish of Original Loading

The ADF read pulse motor is turned OFF **778 pulses** after the leading edge of the original blocks the light path of the Original IN sensor.

- Change of Panel Display & Preparation for Master Making

The "Master-Making/Print" display on the operation panel is changed from "PRINT" to "MASTER MAKING". At the same time, the Thermal pressure motor is activated to lower the Thermal print head until the TPH pressure switch is pressed.

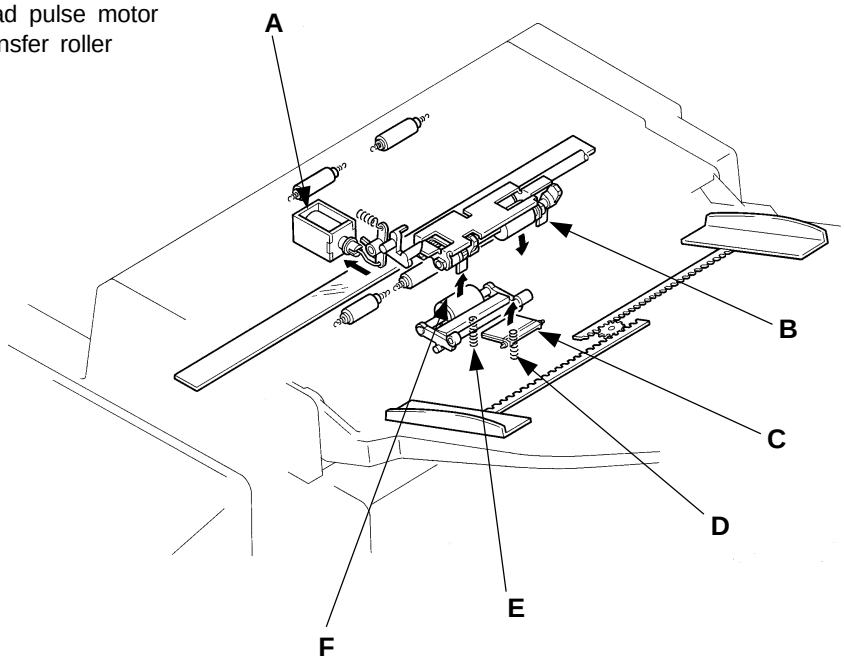
A: ADF exit roller
B: ADF transfer roller
C: ADF stripper roller(upeer)
D: ADF pickup roller(upper)
E: ADF original detection sensor
F: ADF stripper roller(lower)
G: Original registration sensor
H: Original IN sensor
I: White roller

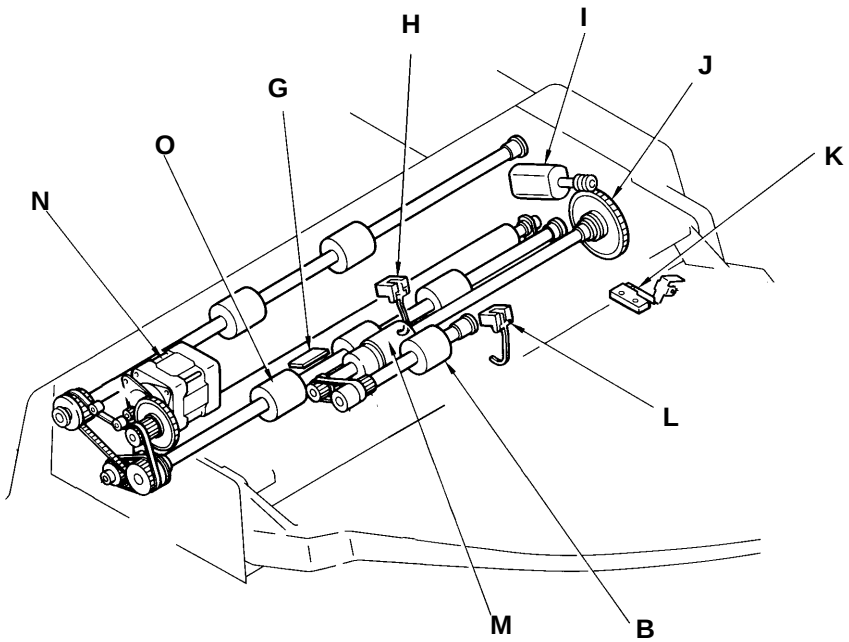


THEORY OF OPERATION

Test Mode No.34 ADF original detection sensor
– Short interval beeps when pressed
No.35 Original registration sensor
– Short interval beeps when pressed
No.36 Original IN sensor
– Short interval beeps when light path is blocked
No.46 ADF SW
– Short interval beeps when pressed
No.76 Original pickup solenoid
No.78 Original pickup motor
No.113 ADF original feed operation

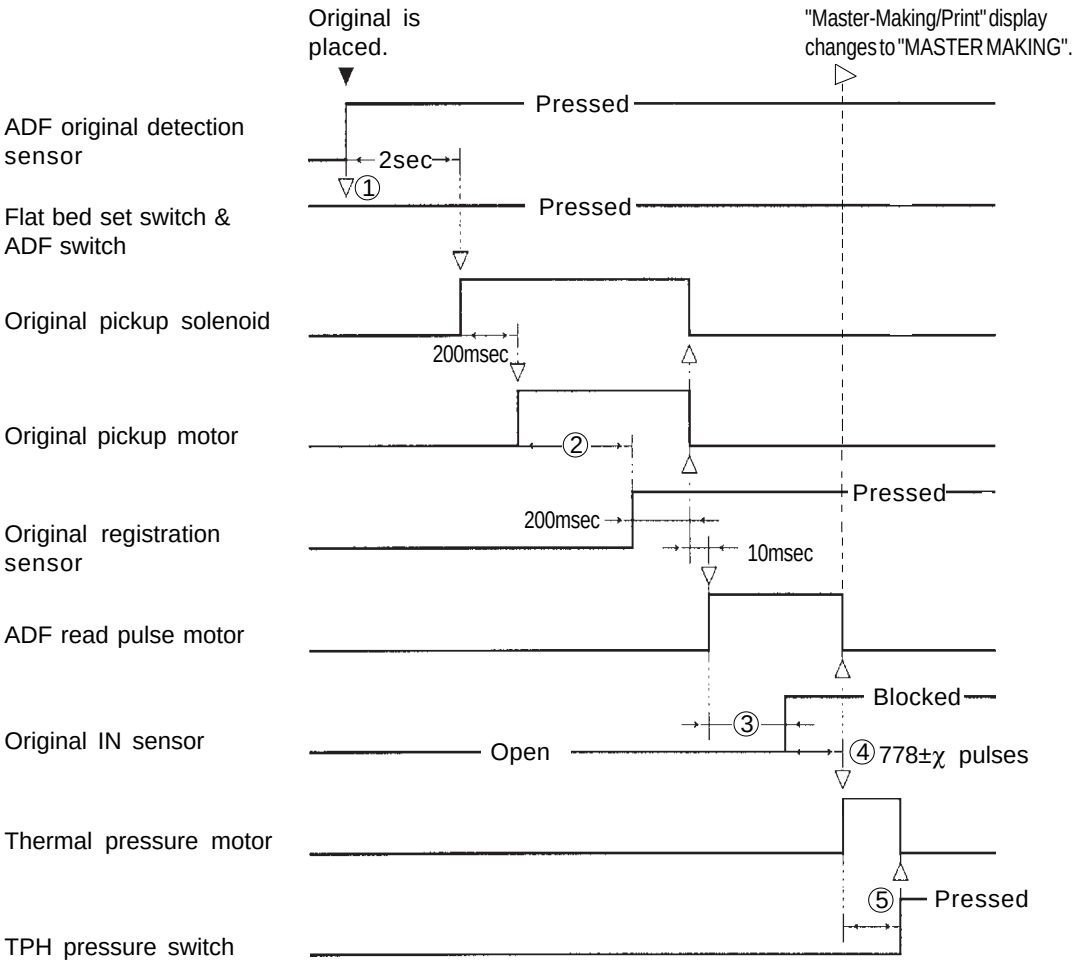
A: Original pickup solenoid
B: ADF pickup roller(upper)
C: Stripper pad
D: Tray spring
E: Stripper arm spring
F: ADF stripper roller(lower)
G: Original IN sensor
H: Original registration sensor
I: Original pickup motor
J: ADF gear
K: ADF switch
L: ADF original detection sensor
M: ADF stripper roller(upper)
N: ADF read pulse motor
O: ADF transfer roller





- Timing Chart -

ADF Original Loading System



① The Flat bed set switch and ADF switch should be actuated ON to activate the ADF original detection sensor.
② If the Original registration sensor has not detected an original **within 1.35 seconds** after the original pickup motor is activated, the machine assumes the original has misfed and displays the error message “ORIGINAL MISFEED OPEN ADF COVER AND RESET ORIGINAL”.
③ If the Original IN sensor has not detected an original **within 630 pulses** after the ADF read pulse motor is activated, the machine assumes the original has jammed at the ADF entrance and displays the error message “ORIGINAL JAM RESET ORIGINAL”.
④ The adjustment of "x" pulses is possible by using the Memory switch **No.218**.
⑤ If the TPH pressure switch has not been actuated ON **within 4 seconds** after the Thermal pressure motor is activated, the machine assumes that the Thermal pressure motor has been locked and displays the error message “T19 CALL SERVICE”.

2. ADF Image Scanning System - in Auto Scanning Contrast Adjustment Mode

- Shading Compensation

When the "START" button is pressed, after the original has been set in position, the LEDs of the Image Scanner are turned ON and the shading compensation is made.

200ms later, the Flat bed read pulse motor is activated, leading the Image scanner to the position for image scanning under the ADF unit.

- Reading (Detection) of Original Background Density [AUTO BASE CONTROL]

After the Image scanner slides out of the Image scanner ADF shading sensor, the Flat bed read pulse motor rotates **1811 pulses** more and then stops with the Image scanner positioned for image scanning.

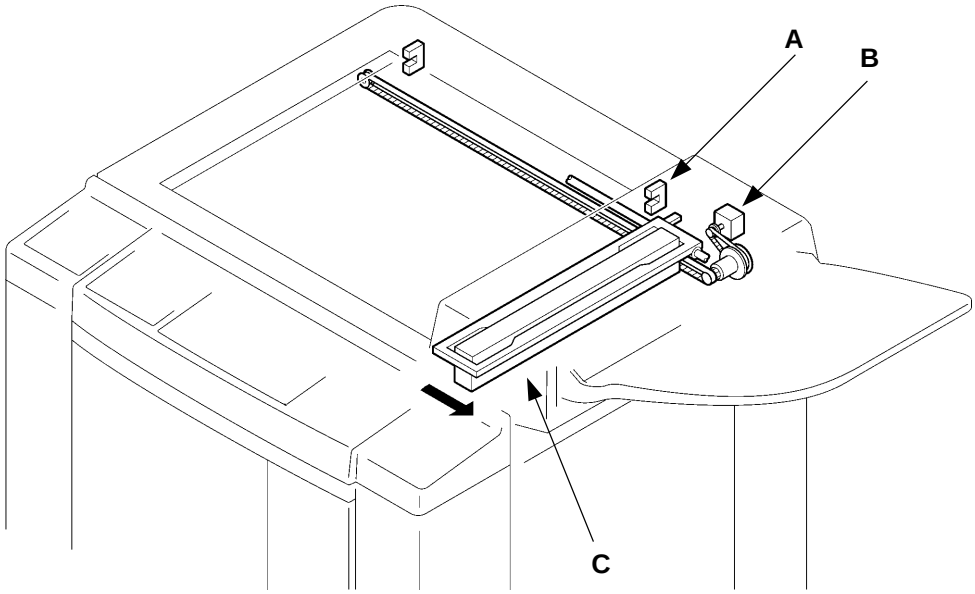
At the same time, the Auto base control data is cleared from the memory on the Image processing PCB and the Image scanner starts reading the original background density for the new Auto base control data.

- Start of Image Scanning

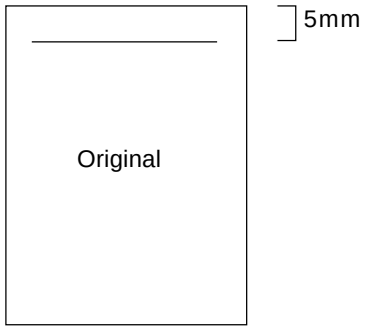
After the original background density data which has been read in are processed into the new Auto base control data, the FB-ADF read pulse motor is activated to feed the original and the Read & Write start signal is turned ON to start image scanning.

- Availability of Auto Scanning Contrast Adjustment Mode

The Auto scanning contrast adjustment mode is not available with the Photo mode, Duo mode or Dot photo mode.



A: Image scanner ADF shading sensor
B: Flat bed read pulse motor
C: Image scanner

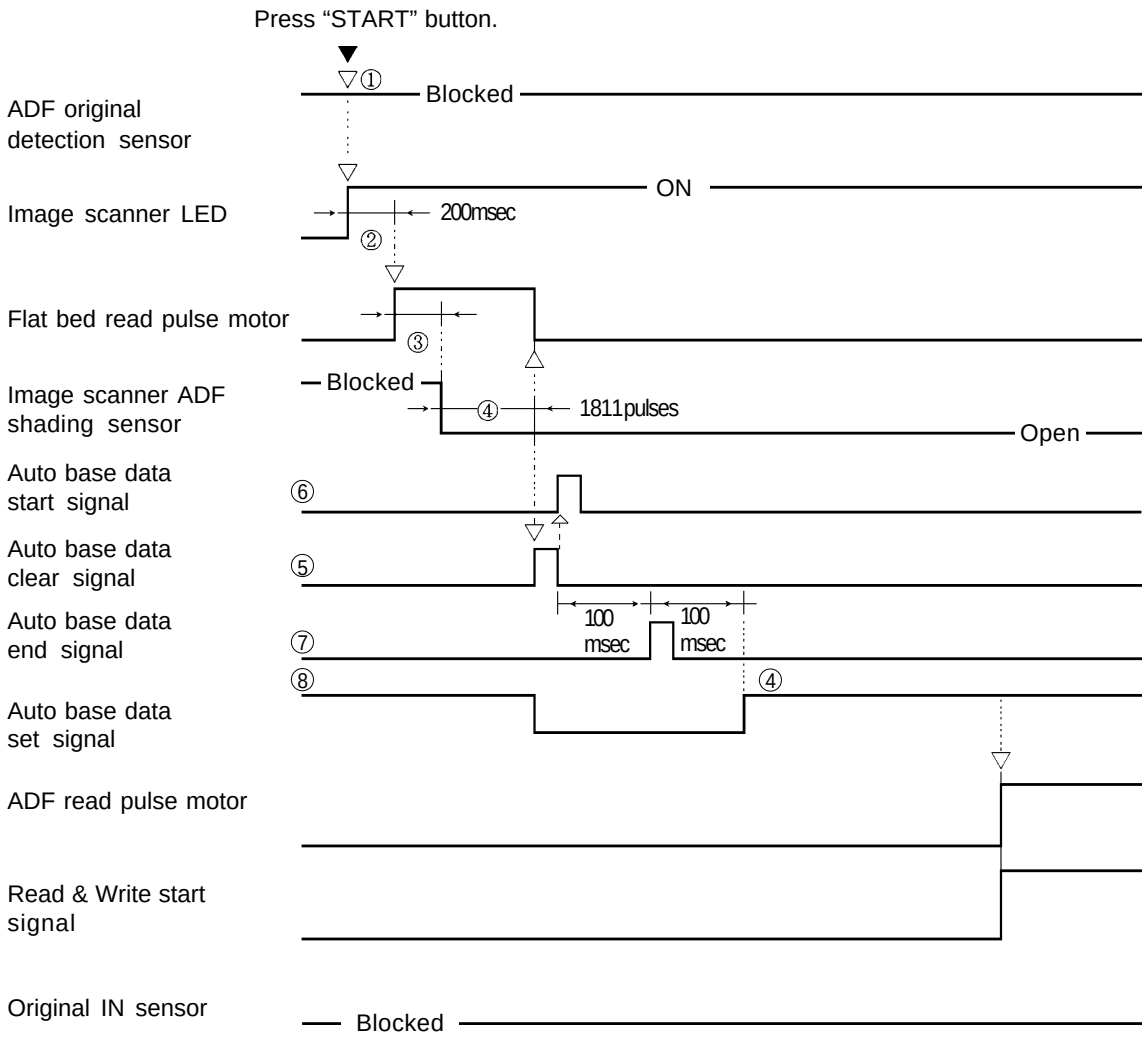


THEORY OF OPERATION

Test Mode No.50 Image scanner ADF shading sensor – Light up when light path is blocked
No.79 Image scanner LED lighting
No.108 Flat bed pulse motor continuous operation
No.113 ADF original feed operation

- Timing Chart -

ADF Image Scanning System - in Auto Scanning Contrast Adjustment Mode



① The "START" key cannot be activated until an original is completely loaded in the ADF.
② The shading compensation is made automatically when the LEDs of the Image scanner are turned ON.
③ If the Image scanner has not gone out of the Image scanner ADF shading sensor **within 314 pulses** after the Flat bed read pulse motor is activated, i.e. the light path of the sensor has not been opened, it is assumed that the Flat bed read pulse motor has been locked and the error message **"T15 CALL SERVICE"** is displayed on the operation panel.
④ If the Auto base data set signal has not been turned ON 100 msec after the Auto base data end signal is output, the error message **"T10 TURN MAIN POWER SW. OFF THEN ON"** is displayed on the operation panel.
⑤ If the Auto base data clear signal is turned on, the previous Auto base data will be cleared.
⑥ If the Auto base data start signal is turned on, the image data will be taken in by the image scanner.
⑦ The Auto base data end signal is to signal the end of taking in the image data.
⑧ The Auto base data set signal is turned on when the Auto base data is stored.

T10 (Image Processing PCB Failure)
• 2. Auto base data set signal not turned ON

ADF PCB Original IN sensor
– Light up when light path is blocked

3. ADF Image Scanning System

- Shading Compensation

When the "START" button is pressed, after the original has been set in position, the LEDs of the Image Scanner are turned ON and the shading compensation is made.

200ms later, the Flat bed read pulse motor is activated, leading the Image scanner to the position for image scanning under the ADF unit.

- Start of Scanning

After the Image scanner slides out of the Image scanner ADF shading sensor, the Flat bed read pulse motor rotates **1811 pulses** more and then stops with the Image scanner positioned for image scanning.

At the same time, the ADF read pulse motor is activated to feed the original by rotating the ADF transfer roller and ADF exit roller via pulleys and belt, and the Read & Write start signal is turned ON to start the scanning of the original.

- Finish of Scanning

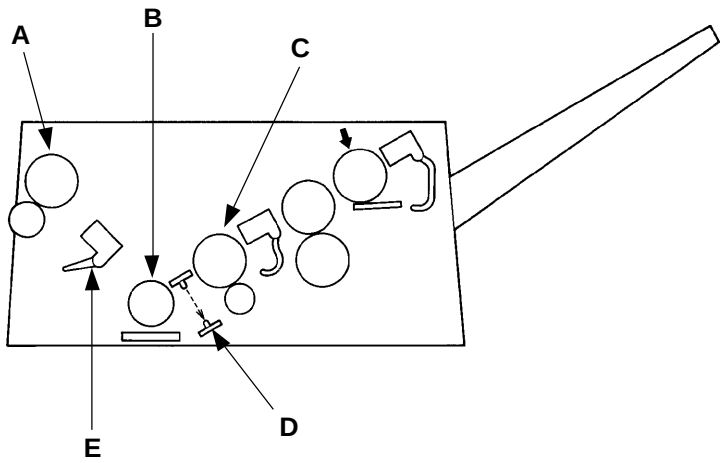
The original proceeding through the ADF unit opens the light path of the Original OUT sensor by pushing the actuator out of the sensor.

When the original advances further and its trailing edge passes through the Original IN sensor and opens its light path, **278 pulses** later, the Read & Write start signal is turned OFF to end the scanning of the original.

- Ejection of the Original

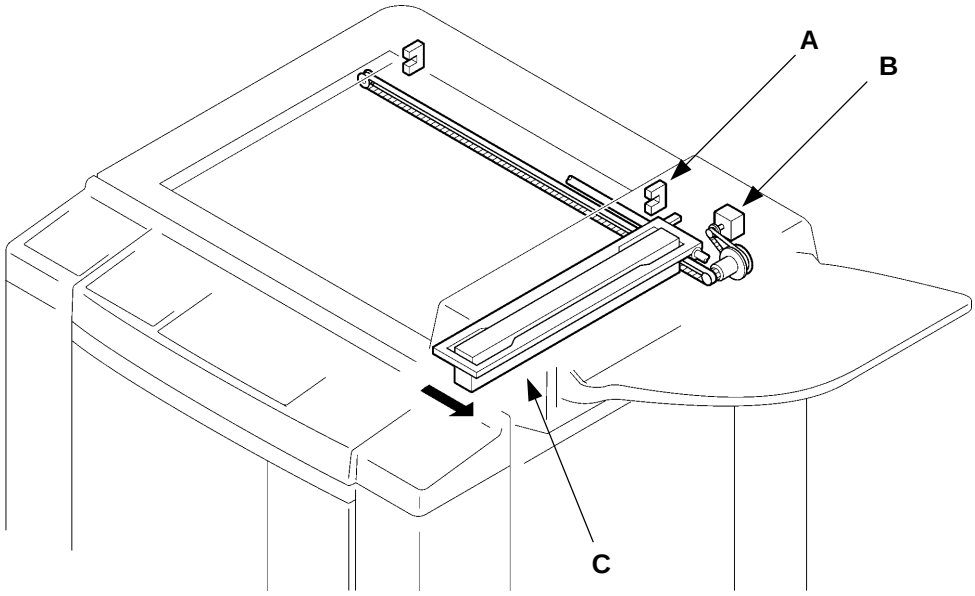
The ADF read pulse motor is rotated further for **3780 pulses** after the Read and Write start signal is turned OFF to finish the transportation of the original out of the ADF unit.

A: ADF exit roller
B: White roller
C: ADF transfer roller
D: Original IN sensor
E: Original OUT sensor

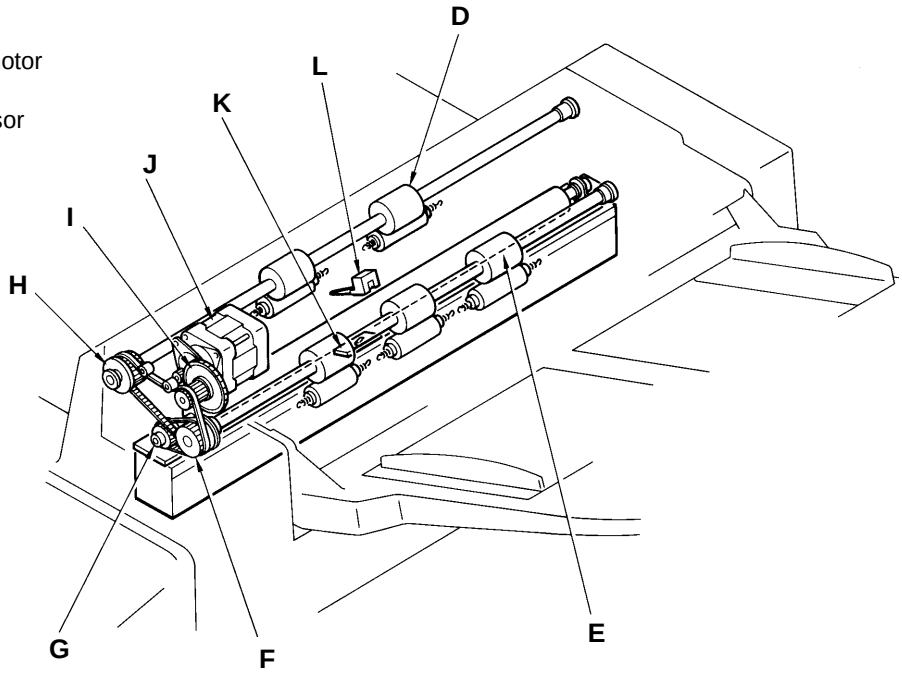


THEORY OF OPERATION

Test Mode No.36 Original IN sensor
– Short interval beeps when light path is blocked
No.45 Original OUT sensor
– Short interval beeps when pressed
No.50 Image scanner ADF shading sensor
– Short interval beeps when light path is blocked
No.79 Image scanner LED lighting
No.113 ADF original feed operation

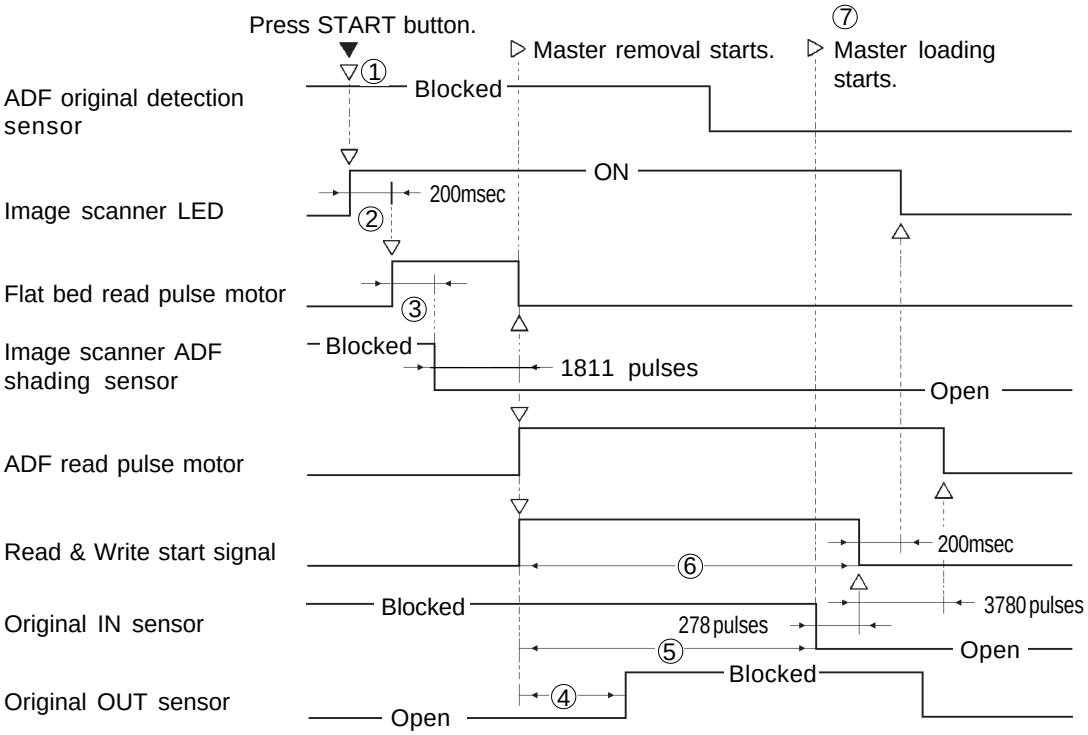


A: Image scanner ADF shading sensor
B: Flat bed read pulse motor
C: Image scanner
D: ADF exit roller
E: ADF transfer roller
F: Transfer roller pulley
G: Read roller pulley
H: ADF exit pulley
I: ADF main gear
J: ADF read pulse motor
K: Original IN sensor
L: Original OUT sensor



- Timing Chart -

ADF Image Scanning System



① The "START" button cannot be activated until an original is completely loaded in the ADF.
② The shading compensation starts when the LED arrays of the Image scanner are turned ON.
③ If the Image scanner has not slided out of the Image scanner ADF shading sensor **within 314 pulses** after the Flat bed read pulse motor is activated, it is assumed that Flat bed read pulse motor has been locked and the error code **[T 15]** is displayed on the operation panel.
④ If the Original OUT sensor has not detected an original **within 1890 pulses** after the ADF read pulse motor is activated, it is assumed that the original has jammed at the exit of ADF and the error message “ORIGINAL JAM RESET ORIGINAL” is displayed on the operation panel**.**
⑤ If the Original IN sensor keeps detecting an original **for 14803 pulses** after the ADF read pulse motor was activated, the machine assumes the original has jammed or is oversized and indicates the error message “ORIGINAL JAM REMOVE ORIGINAL” on the operation panel.
⑥ The Read & Write start signal is turned OFF **278 pulses** after the trailing edge of the original clears out of the Original IN sensor, or when the Write pulse motor has rotated for the size of paper on the Paper feed tray.
⑦ When the trailing edge of the original clears out of the Original IN sensor, a new-made master starts to be loaded on the Drum after confirming that a used master is completely removed from the Drum.
If the Read & Write start signal is turned OFF before the original clears out of the Original IN sensor, the new-made master starts to be loaded on the Drum at that time.

ADF PCB LED D6(IN) Original IN sensor
– Light up when light path is blocked
Test Mode No.36 Original IN sensor
– Short interval beeps when light path is blocked
No.46 ADF SW
– Short interval beeps when pressed

REMOVAL & ASSEMBLY

1. ADF Glass, ADF Original IN Sensor (receive), ADF Switch, White Roller

< Removal Procedure >

ADF Glass

1. Turn OFF the power and remove the FB-ADF unit from the machine.
2. Remove the mounting screws on the Image scanner glass holders (L) and (R), and remove the holders.
3. Take out the ADF glass carefully.

ADF Original IN Sensor (receive)

2. Unplug the connector of the ADF original IN sensor (receive).
3. Remove the mounting screw of the ADF original IN sensor (receive), and remove the sensor from the ADF unit, peeling off the tape securing the wires of the sensor.

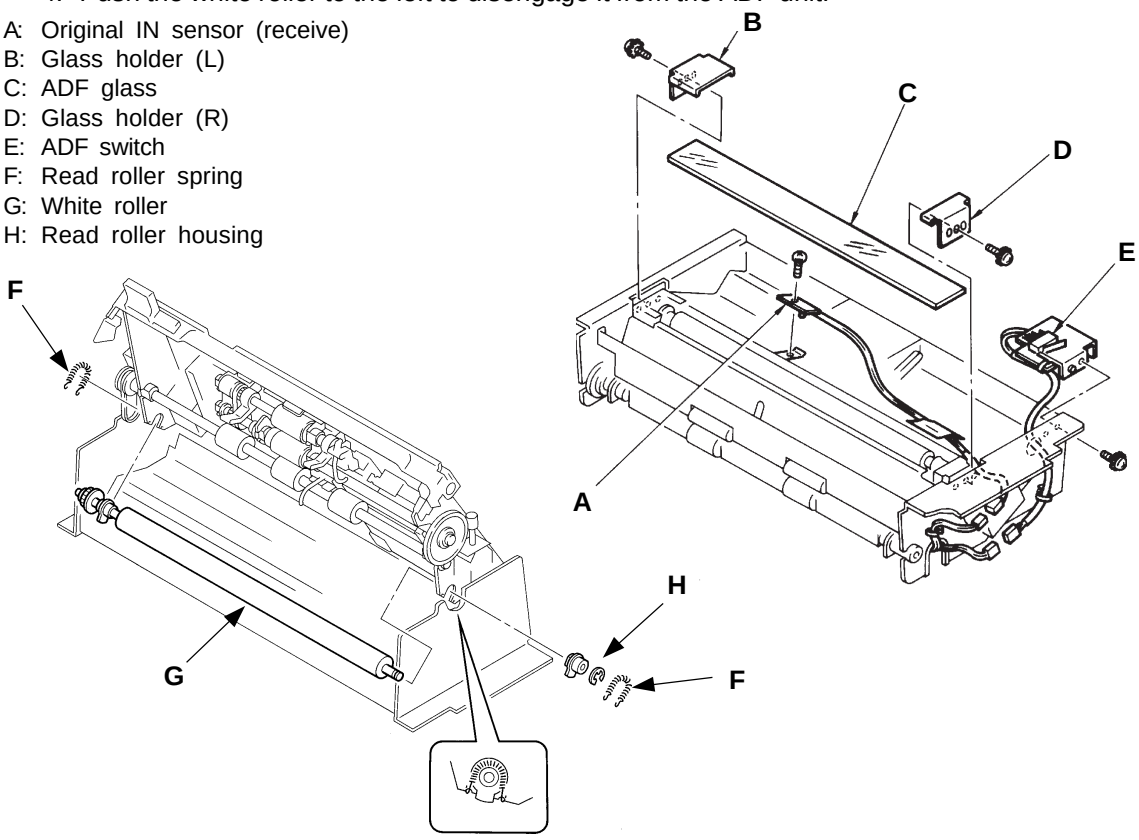
ADF Switch

2. Unplug the connector of the ADF switch and cut the wire clamper securing the wires of the switch.
3. Remove the mounting screw of the ADF switch bracket, and remove the bracket with the switch.

White Roller

2. Remove the two Read roller springs from both ends of the shaft.
3. Remove an E ring on end of the shaft and remove the Read roller housing.
4. Push the white roller to the left to disengage it from the ADF unit.

A: Original IN sensor (receive)
B: Glass holder (L)
C: ADF glass
D: Glass holder (R)
E: ADF switch
F: Read roller spring
G: White roller
H: Read roller housing



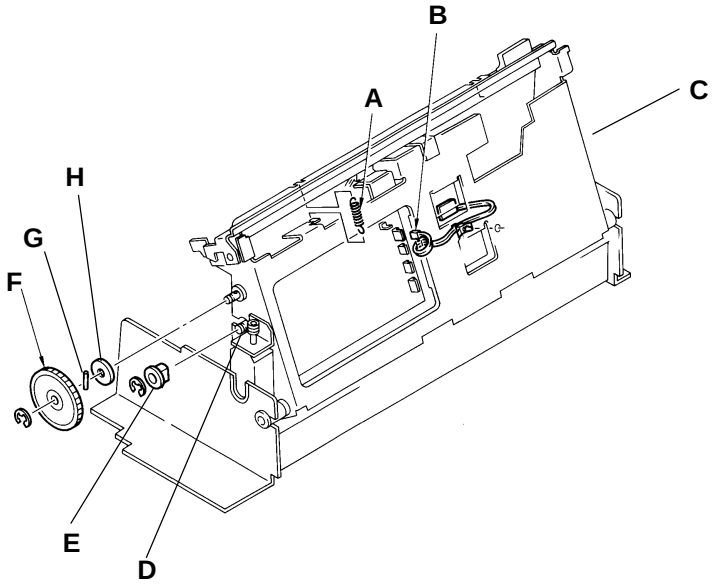
ADF PCB LED D6(IN) Original IN sensor
– Light up when light path is blocked
Test Mode No.36 Original IN sensor
– Short interval beeps when light path is blocked

2. Original IN Sensor (send), ADF Transfer Roller, Original Pickup solenoid

< Removal Procedure >

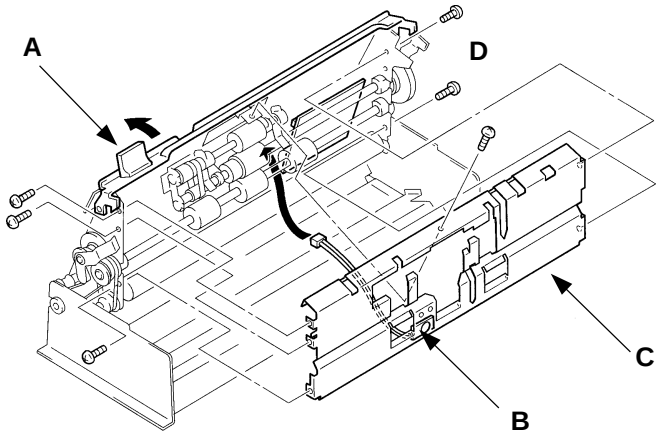
1. Turn OFF the power, and remove the ADF cover.
2. Remove the Open lever spring.
3. Unplug the connector of the Original IN sensor from CN8 of the ADF PCB and pinch the Wire harness band with a pair of pliers and push it off from the ADF upper frame.
4. Remove an E ring on the ADF gear and slide out the ADF gear, Parallel pin and Spacer.
   [IMPORTANT]
   Don't drop the parallel pin when removing the ADF gear because it will be freed.
5. Remove an E ring from the ADF transfer roller and slide out the Metal.

A: Open lever spring
B: Connector
C: ADF upper frame
D: ADF transfer roller
E: Metal
F: ADF gear
G: Parallel pin
H: Spacer



Original IN Sensor (send)

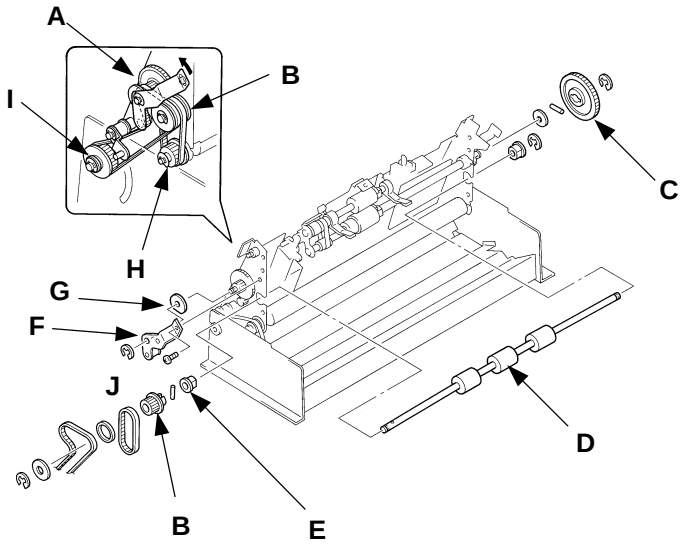
6. Remove six mounting screws on the ADF original guide (F) and remove the guide with the Original IN sensor attached.



A: ADF open lever
B: Original IN sensor
C: ADF original guide (F)
D: Bind-head IB Lock Screw M3x6

ADF Transfer Roller

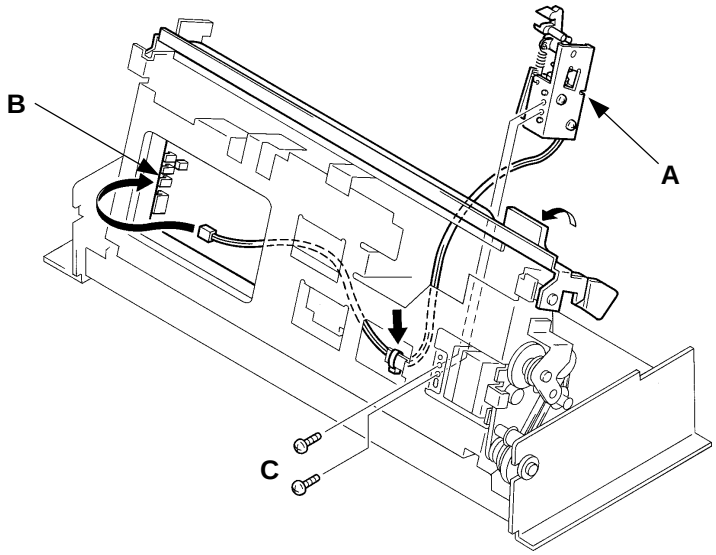
7. Remove the mounting screw and an E ring on the ADF tension plate, and remove the ADF tension plate and disengage the belt.
8. Remove an E ring on the ADF transfer roller and remove the Transfer roller pulley while disengaging the belt, and remove the Parallel pin and Plastic collar to free the ADF transfer roller from the ADF unit.
   [IMPORTANT]
   Don't drop the parallel pin when removing the ADF gear because it will be freed.



A: Main gear
B: Transfer roller pulley
C: ADF gear
D: ADF transfer roller
E: Plastic collar
F: ADF tension plate
G: Main gear spacer
H: Read roller pulley
I: Exit pulley
J: Pan-head Screw SW

Original Pickup Solenoid

9. Unplug the connector of the Original pickup solenoid from CN2 of the ADF PCB and remove two mounting screws on the solenoid.



A: Original pickup solenoid
B: CN2
C: Bind-head IB Lock Screw M3x6

Test Mode No.34 ADF Original detection sensor
– Short interval beeps when pressed
No.35 Original registration sensor
– Short interval beeps when pressed

3. ADF Original Detection Sensor, Original Registration Sensor

< Removal Procedure >

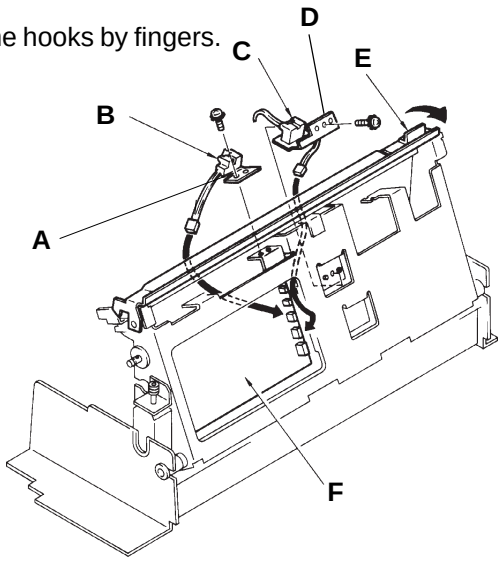
ADF Original Detection Sensor

1. Remove the FB-ADF original guide (F).
2. Unplug the Connector from CN9 of the ADF PCB.
3. Remove the mounting screw on the Original detection sensor bracket and lift the ADF open lever.
4. Remove the Original detection sensor bracket with the sensor from the ADF unit.

Original Registration Sensor

1. Unplug the Connector from CN10 of the ADF PCB.
2. Remove the mounting screw on the Original registration sensor bracket and remove the bracket with the sensor from the ADF unit.
3. Separate the sensor from the bracket by pinching the hooks by fingers.

A: Original detection sensor bracket
B: ADF original detection sensor
C: Original registration sensor
D: Registration sensor bracket
E: ADF open lever
F: ADF PCB



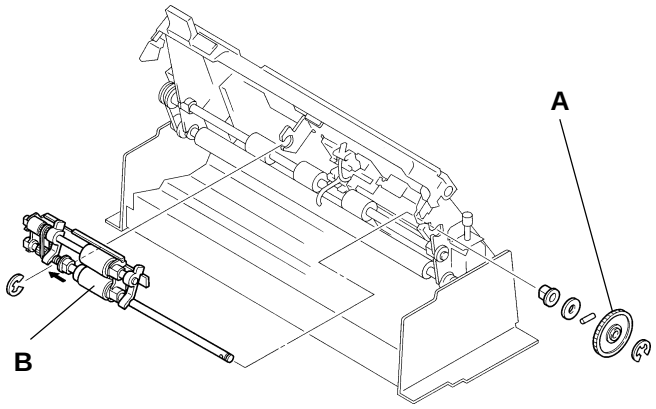
4. ADF Pickup (Upper) Ass'y, ADF Stripper Ass'y

<Removal Procedure>

ADF Pickup (Upper) Ass'y

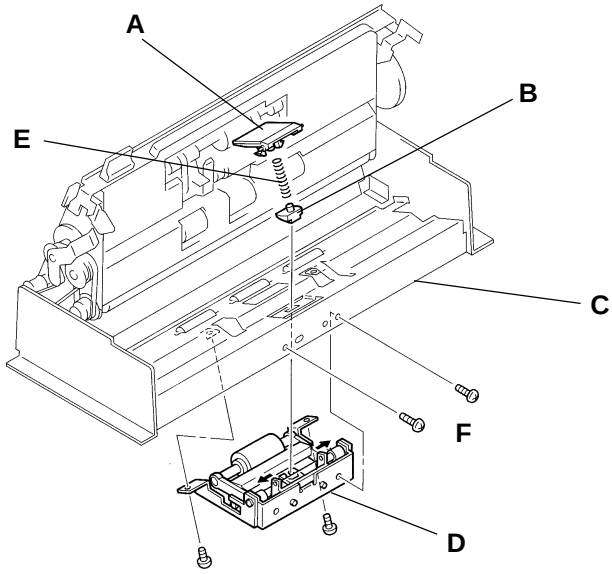
1. Remove the ADF original guide (F).
2. Remove the ADF original detection sensor.
3. Remove an E ring on the right side of the ADF pickup (upper) ass'y.
4. Slide and remove the ADF pickup ass'y to the left.

A: ADF gear
B: ADF pickup (upper) Ass'y



ADF Stripper Ass'y

1. Remove four mounting screws on the ADF stripper ass'y and remove it from the ADF lower frame.



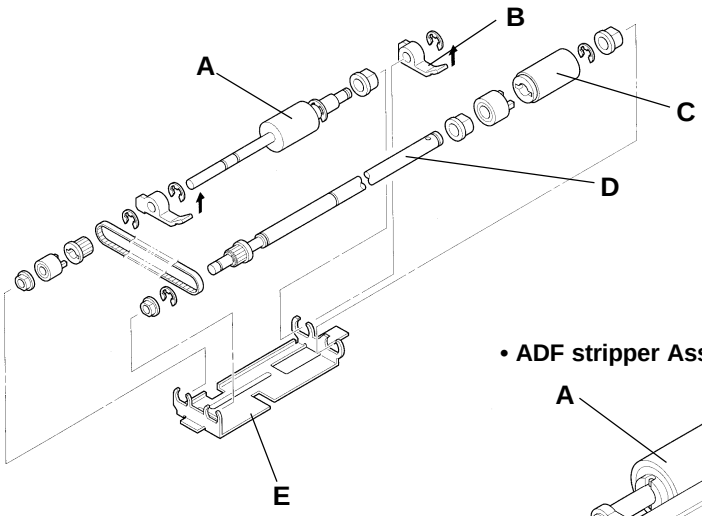
A: Stripper pad
B: Tray push
C: ADF lower frame
D: ADF stripper Ass'y
E: Tray spring
F: Bind-head IB Lock Screw M3x6

Disassembly of ADF Pickup (upper) Ass'y, ADF stripper Ass'y

< Disassembly >

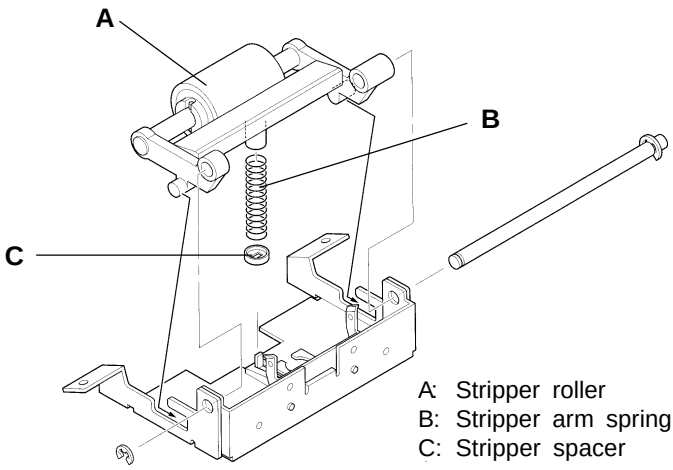
1. Disassembly and reassembly the these ass'y, showing the illustration below.

• ADF Pickup (upper) Ass'y



A: ADF Pickup roller
B: Lever shutter
C: ADF stripper roller
D: Stripper roller shaft
E: Pickup roller frame

• ADF stripper Ass'y



A: Stripper roller
B: Stripper arm spring
C: Stripper spacer

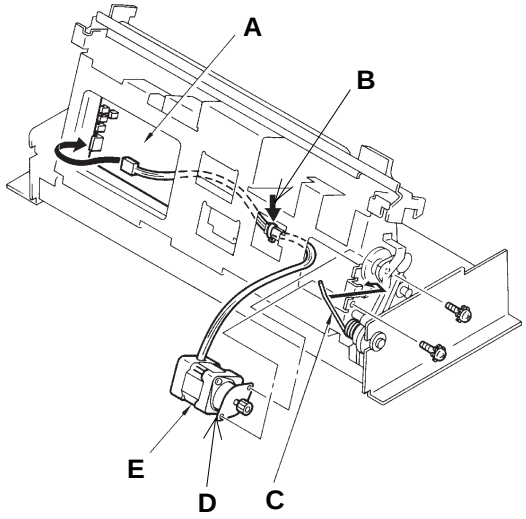
Test Mode No.45 Original OUT sensor
– Short interval beeps when pressed
No.78 Original pickup motor

5. ADF Read Pulse Motor

< Removal Procedure >

1. Turn OFF the power, and remove the ADF cover .
2. Unplug the connector of the ADF read pulse motor from CN1 of the ADF PCB and cut the Wire harness band to free the motor cord from the ADF unit.
3. Unhook the ADF spring (L) from the ADF upper frame.
4. Remove the two mounting screws on the ADF read pulse motor mount, and remove the motor with the mount from the ADF unit.

A: ADF PCB
B: Wire harness band
C: ADF spring (L)
D: Read pulse motor mount
E: ADF read pulse motor



6. Original Pickup Motor, Original OUT Sensor

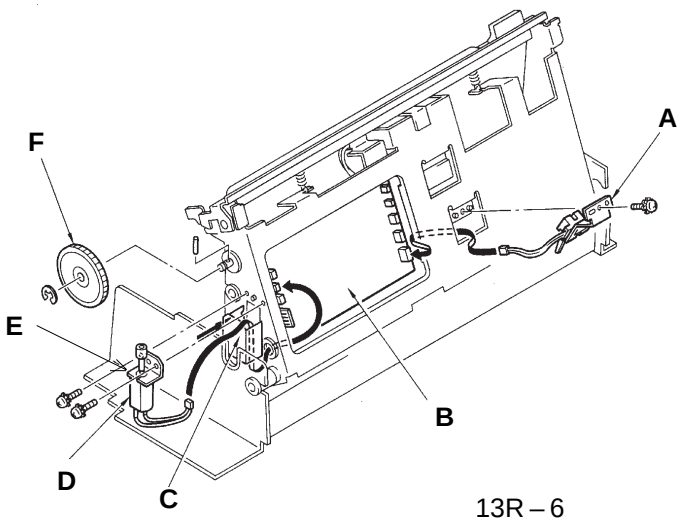
< Removal Procedure >

ADF Motor

1. Turn OFF the power, and remove the ADF cover .
2. Unhook the E ring and being careful not to misplace the parallel pin, remove the ADF gear.
3. Loosen the mounting screw of the Original pickup motor cover.
4. Remove the two mounting screws of the Motor bracket and unplug the Connector from CN3 of the ADF PCB.
5. Remove the Original pickup motor together with the bracket.

Original OUT Sensor

2. Remove the mounting screw of the Original OUT sensor bracket.
3. Unplug the Connector of the Original OUT sensor from CN11 of the ADF PCB and remove the sensor from the FB-ADF unit, together with the bracket.



A: Original OUT sensor bracket
B: ADF PCB
C: Original pickup motor cover
D: Original pickup motor
E: Original pickup motor bracket
F: ADF gear

ADJUSTMENT

ADF PCB LED D6(IN) Original IN sensor
– Light up when light path is blocked
Test Mode No.36 Original IN sensor
– Short interval beeps when light path is blocked

ADJUSTMENT

1. Sensitivity of Original IN Sensor

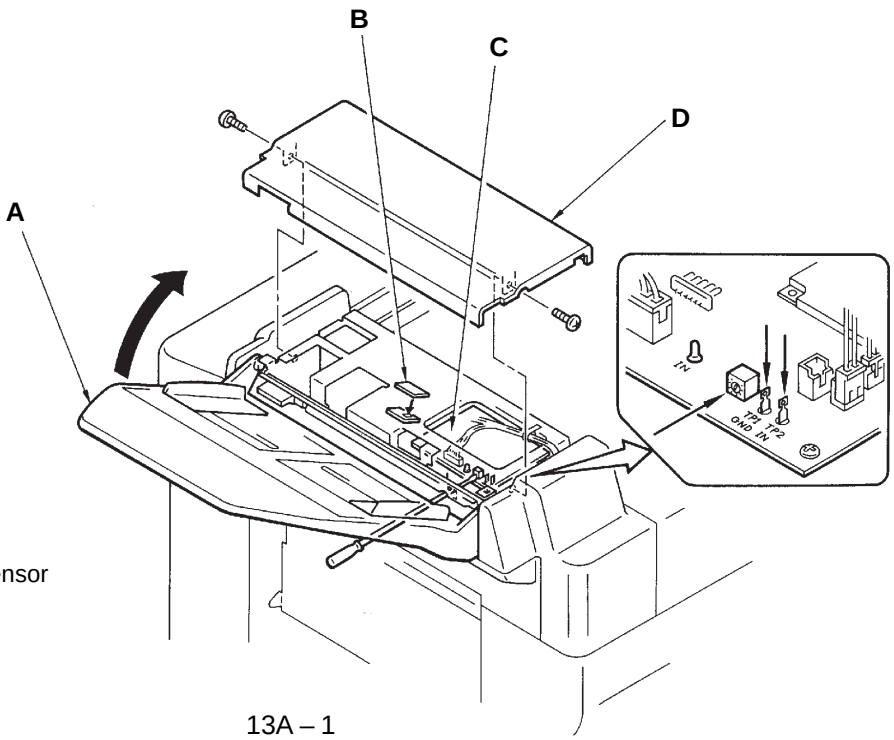
1. Turn OFF the power and remove the ADF Cover.
2. Connect a voltage meter between **TP1 (IN)** and **TP(2) (GND)** on the ADF PCB.
3. Turn ON the power and place a white sheet of paper in the light path of the Original IN sensor. The voltage should read **1.0±0.2** volts with a sheet of paper, and more than **3.0 volts** without (the light path of the Original IN Sensor not blocked).
4. If the above voltages are not obtained, adjust the sensitivity of the sensor by turning **VR1** on the ADF PCB.
   [Note]
   Turn the VR1 clockwise to increase the sensitivity of the sensor (the voltage increases).

- Check -

- Check the LED "**IN**" on the ADF PCB.
  Confirm that it illuminates when the light path of the Original IN sensor is blocked (a sheet of paper is inserted), and goes out when the sensor's light path is open (a sheet of paper is not inserted).

- Result of Misadjustment -

- If the sensitivity of the sensor is too high;
  The Original IN sensor cannot detect the original fed to the Image scanner even if the original is actually fed, and it is determined that the original has jammed before the Image scanner.
  As a result, the original jam error message "ORIGINAL JAM RESET ORIGINAL" will be displayed.
- If the sensitivity of the sensor is too low;
  It is determined that an original has already jammed before master making and the original jam error message "ORIGINAL JAM RESET ORIGINAL" will be displayed.



A: Original tray
B: Original IN sensor
C: ADF PCB
D: ADF cover

2. Scanning Start Position

When using ADF Unit for the Scanning

1. Using an original with continuous image from the top (original without white margin on the top), make a master through the ADF Unit, and make a print.
2. Check the print and confirm that the top **5±2mm** of the measure is erased on the print.
3. If more or less is erased, use Memory SW **No.218** to make the correction.
4. Press the PRINT POSITION button to select a Memory switch setting referring to the chart below.
   For instance, if Memory switch setting number **9** needs to be selected, press the PRINT POSITION button to move the number up or down until the display shows **9 218**.
5. Press the **STOP** button and then the **ALL RESET** button to input the selected number.
   The panel display returns to an ordinary indication.

- Precautions in Adjustment -

- The once-input Memory switch setting cannot be erased even if Test mode No.90 or 97 is activated or when System ROM is replaced.
- The Memory switch setting is erased when **System PCB** is replaced or when Test mode **No.98** is applied.
  In this case all other Memory switch settings will also be erased.

SW Setting	9	A	B	C	D	E	F	O
Amount (mm)	-2.8	-2.4	-2.0	-1.6	-1.2	-0.8	-0.4	0
SW Setting	1	2	3	4	5	6	7	8
Amount (mm)	+0.4	+0.8	+1.2	+1.6	+2.0	+2.4	+2.8	+3.2

Decrease ◄——— Skip Amount ———► Increase

3. Horizontal Scanning Position

- When using ADF Unit for Scanning

1. Make a master at **[1:1]** size using **Test chart** through the ADF Unit.
2. Check if all "e" marks on both sides of the test chart original appear on the master on the Drum.
3. If not, adjust the horizontal scanning position by Memory SW **No.217**, referring to the chart below.

[IMPORTANT]

If "e" marks on both sides are missing in a large area, check the installation position of the **Paper size potentiometer** under the Paper feed tray, and the **Master making width adjustmen**t.

- Precautions in Adjustment -

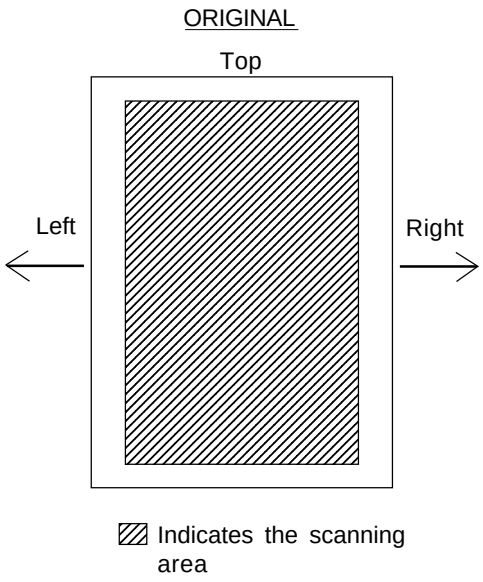
- The once-input Memory switch setting cannot be erased even if Test mode No.90 or 97 is activated or when System ROM is replaced.
- The Memory switch setting is erased when **System PCB** is replaced or when Test mode **No.98** is applied.
  In this case all other Memory switch settings which have been input will also be erased.

Memory SW No.217

SW setting	Amount (mm)
9	-3.5
A	-3.0
B	-2.5
C	-2.0
D	-1.5
E	-1.0
F	-0.5
0	0
1	+0.5
2	+1.0
3	+1.5
4	+2.0
5	+2.5
6	+3.0
7	+3.5
8	+4.0

The scanning area slides to the left.

The scanning area slides to the right.



4. Image Elongation/Shrinkage Correction

- When using ADF unit for Scanning (ADF Read pulse motor speed adjustment).

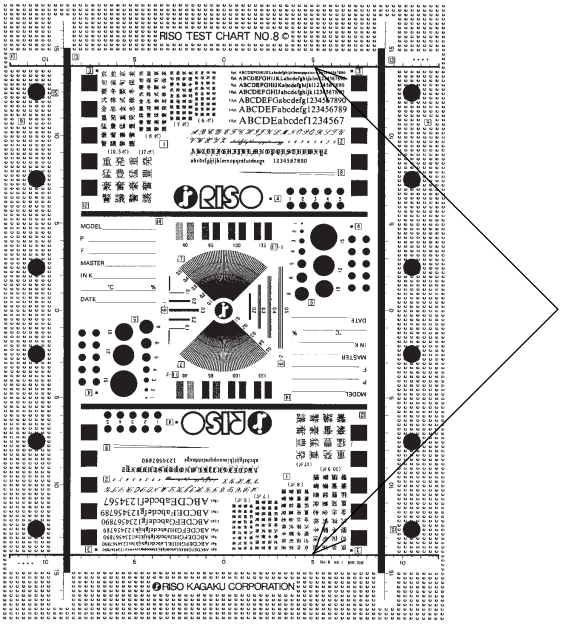
1. Make a master at **[1:1]** size using **Test chart** through the ADF Unit and make prints.
2. Compare printouts with the test chart original.
   Check that the difference in image size is **within 4mm** in the area between the top and bottom scaled lines, between the printouts and the test chart original.
3. If it is elongated or shrunk **by 4mm or more**, compared to the original size, select the Memory SW No. 216 and use the PRINT POSITION Key on the operation panel to select a desired Memory SW setting number, referring to the chart below.
   [IMPORTANT]
   Be sure to turn OFF the machine each time the Hex SW is turned to update the memory.

SW Setting	9	A	B	C	D	E	F	O
Amount (mm)	-7	-6	-5	-4	-3	-2	-1	0
SW Setting	1	2	3	4	5	6	7	8
Amount (mm)	+1	+2	+3	+4	+5	+6	+7	+8

Expansion Amount

- Precautions in Adjustment -

- There may be more than one reason for elongation or shrinkage of printed image.
  Mechanical causes, i.e. backward tension on the master roll, wear of the White roller, loose screw in the pulleys, etc. should also be checked.



[Test Chart]